

Serial No. 10/541,610

**AMENDMENTS TO THE DRAWINGS:**

The attached replacement sheet(s) of drawings include(s) changes to Figs. 20-23B.

In each of the amended figures, a label "Prior Art" has been added per the Examiner's request.

Attachment: Replacement Sheet(s)

**REMARKS**

Counsel thanks Examiner R. Rainey and Supervisory Primary Examiner A. Mengistu for the courtesy of an interview held on February 19, 2008.

The foregoing amendments, which have been discussed at the interview with the Examiners, are now officially submitted for the Office's consideration. In particular, claims 1-21 have been amended to better define the claimed invention. Claims 22-25 have been cancelled without prejudice or disclaimer and to simplify the issues. New claim 26 have been added to provide Applicants with the scope of protection to which they are believed entitled. The Abstract and drawings have been revised to be compliant with commonly accepted US patent practice. No new matter has been introduced through the foregoing amendments.

The objections to the Abstract and drawings as well as the 35 U.S.C. 112 rejections of claims 22-25 are either moot or believed overcome in view of the above amendments.

The 35 U.S.C. 103(a) rejection of claims 1-25 as being obvious over *Vassallo* in view of *Bailey* is noted. Basically, the Office argued that *Vassallo* teaches all features of the independent claims except for the piezoelectric motor which is allegedly found in *Bailey*. The Office then stated that it would have been obvious to use the piezoelectric structure as taught by *Bailey* in the haptic feedback device of *Vassallo* to arrive at the claimed invention.

Applicants respectfully disagree, because the teaching reference of *Bailey* does not include an enabling disclosure of the claimed piezoelectric motor. The most relevant teaching of *Bailey* appears to be paragraph 0054 which is reproduced herein below:

[0054] In another embodiment, a haptic device includes a variable-stiffness mechanical actuator. If the spring constant (K) value of a compliant portion of an elastic member can be varied as a function of drive frequency, then the haptic device can operate near a peak magnification and efficiency. A variable-stiffness mechanical actuator can be, for example, a piezoelectric structure (e.g., a piezoelectric buzzer). Such a piezoelectric structure can include, for example, a ceramic on a

mass where an applied voltage causes movement of the ceramic. Through the proper selection of the applied voltage, the ceramic can behave in a manner similar to a spring. The piezoelectric structure can change its spring constant as a function of bias voltage. Consequently, a frequency-to-voltage converter driving the piezo structure element can maintain a resonance frequency of haptic device by adjusting the spring constant.

A person of ordinary skill in the art would recognize that the *Bailey* teaching relates, at best, to a piezoelectric structure used for varying a spring constant of the haptic device. The person of ordinary skill in the art would therefore not consider the *Bailey* piezoelectric structure to include a piezoelectric motor having a stator and a rotor (which by definition is rotatable relative to the stator) as presently claimed. Thus, even assuming *arguendo* that the references could be properly combined as suggested by the Office, the resulting device would still lack the claimed piezoelectric motor with the claimed stator and rotor. The claimed invention is thus patentable over the applied art of record.

Another distinction between the art and the claimed invention has been highlighted in amended claim 1. Specifically, claim 1 now recites, among other things, that “the stator of the piezoelectric motor is in direct physical contact with the rotor, without the intermediary of gears and/or belts, for driving the rotor to rotate to provide haptic feedback to a user of the controller.” The claim feature finds support in at least FIG. 5B where a direct physical contact between rotor 150/152 and stator 142/144 is disclosed. In the applied references, especially *Vassallo*, numerous belts and/or gears are used between cap/rotor 26 and motor 70. The combined device of *Vassallo* and *Bailey*, if proper, would at best include a piezoelectric structure instead of motor 70 and would still have all the belts and/or gears between the piezoelectric structure and cap/rotor 26. As a result, there would be no direct contact between the stator and rotor (if any) as defined in the claimed invention. The presence of the *Vassallo* belts and/or gears would also render the Office’s combined device bulky, contrary to the embodiments of the claimed invention which are compact and miniaturized as shown in FIG. 1B and described in the specification.

Accordingly, Applicants respectfully submit that the invention as defined in the amended

independent claims is patentable over the references as applied by the Examiner. The dependent claims are considered patentable at least for the reasons advanced with respect to the respective independent claims.

As to claim 3, the language of the Office Action does not specify with reasonable clarity how the applied references disclose or suggest the claimed shock-absorbing member. The recitation of FIG. 6 of *Vassallo* is irrelevant, because FIG. 6 of *Vassallo* discloses a DC motor rather than a piezoelectric motor. The *Bailey* reference, as discussed *supra*, discloses no stator or rotor. Both references fail to teach or suggest whether there is a shock absorbing member between the stator and the base or between the cap and the rotor as claimed or not. The rejection of claim 3 is therefore improper and should be withdrawn.

Of particular note, the claimed shock-absorbing member is advantageous in that it prevents the motion or force generated by the piezoelectric motor from being undesirably transmitted to the base and/or the cap. The generated motion or force is thus concentrated to drive the rotor, thereby increasing the device's efficiency. Further, the presence of the shock-absorbing member also inherently allows the rotor to move in the axial direction toward and/or away from the stator to adjust the pressure between the stator and rotor, thereby adjusting the haptic feedback force transmitted to the user's finger. The above advantages are neither disclosed, taught nor suggested by the applied art of record.

New claim 26 has been added to highlight a further feature, i.e., the ring-shaped piezoelectric body which finds support in at least FIG. 2 at 144. The applied references, especially *Bailey*, do not teach or suggest such claim feature. It should further be noted that the references do not fairly teach or suggest the following features of claim 26.

- (1) a piezoelectric motor having a ring-shaped stator and a ring-shaped rotor,
- (2) each of the ring-shaped stator and the ring-shaped rotor defining a cavity through which

a rotational axis of the cap passes,

(3) a rotational state detecting device disposed under the cap,

(4) a circumferential rotation of the piezoelectric motor being detected, the circumferential rotation being centered around the rotational axis of the cap.

The above features distinguish the claimed invention over the references. In *Vassalo*, the accuracy of detection can not be increased because gears are used and the rotation of the shaft itself is detected. The claimed invention, however, can control the rotation of the cap with respect to the base with high precision by using the piezoelectric motor, and improve the accuracy of detection by detecting the circumferential rotation centered around the rotational axis passing through the cavity.

Accordingly, Applicants respectfully submit that new claim 26 is patentable over the applied art of record.

Each of the rejections has been overcome. Accordingly, Applicants respectfully submit that all claims are now in condition for allowance. Early and favorable indication of allowance is courteously solicited.

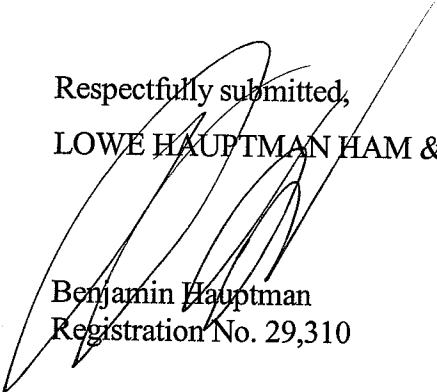
The Examiner is invited to telephone the undersigned, Applicant's attorney of record, to facilitate advancement of the present application.

Serial No. 10/541,610

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,

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